

# Fixation Updates for Hallux Valgus Correction

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## KEYWORDS

• Fixation • Hallux valgus • Bunion • Kirschner wire • Staple • Screw • Plate

## KEY POINTS

- Repair of hallux valgus deformities is a mainstay procedure in every surgical foot and ankle practice.
- Many different fixation devices and constructs can all yield identical surgical outcomes.
- The trend toward more stable internal fixation has allowed for earlier rehabilitation and return to function after surgery.

## INTRODUCTION

Repair of hallux valgus deformities is a mainstay procedure in every surgical foot and ankle practice. Although most procedures performed for the correction of bunion deformities share a common foundation, each foot and ankle surgeon differs slightly in his or her approach to providing the patient with the most optimal surgical outcome. Procedural choices, dissection techniques, fixation methods, and postoperative regimens vary from practitioner to practitioner. In terms of fixation, an almost identical result can be achieved by using many different types of fixation techniques and devices.

As in every facet of medicine and surgery, there have been considerable advances in the nature of fixation devices available for the surgical repair of hallux valgus deformities. The internal fixation options for osteotomies and fusions are now vast considering what existed only 20 years ago. In fact, the original Austin bunionectomy was described without the use of any internal fixation.<sup>1</sup> However, with the growing belief in stable internal fixation as popularized by the AO Foundation, the acceptable methods of performing osteotomies and fusions have evolved throughout the years. The trend toward more stable internal fixation has allowed for earlier rehabilitation and return to function after surgery. In fact, the evolution of certain fixation structures with the use of plates has even permitted early weight bearing in patients who undergo fusions. The alternatives for internal fixation in the correction of hallux valgus are reviewed in this article.

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Clin Podiatr Med Surg 31 (2014) 265–279  
<http://dx.doi.org/10.1016/j.cpm.2013.12.008>

[podiatric.theclinics.com](http://podiatric.theclinics.com)

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## CERCLAGE AND KIRSCHNER WIRE FIXATION

### *Cerclage Wiring*

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The most primitive form of fixation is most probably the use of cerclage wiring. Although not the first choice for most hallux valgus procedures, cerclage and tension band techniques do still find their place in the right circumstances. Cerclage wiring entails the use of flexible wire encircled around an osteotomy or fracture site. Although not ideal, the cerclage technique does afford some level of interfragmentary compression. Probably the most useful application of cerclage wiring is in patients with severely osteoporotic bone where screw purchase is unlikely.<sup>2</sup> Secondly, cerclage methods may be used as a bail out technique in a scenario where the primary form of fixation has failed.

The main procedure cerclage wiring may still be used for as the principle form of fixation is the Akin osteotomy. The most stable construct for the Akin procedure is with an osteotomy that is oriented transversely.<sup>3</sup> Orienting one cut of the wedge parallel to the appropriate joint surface also provides the most accurate correction of the deformity. This, however, results in a transverse osteotomy once the wedge is removed. The transverse orientation is obviously not conducive to screw fixation. Cerclage wiring may therefore be a viable option. Generally, a 26- or 28-gauge monofilament wire is used. The most stable construct when using cerclage wiring to fixate an Akin osteotomy is to pass the loop through four cortices.<sup>3</sup> Load studies using saw bone models have shown that using a dorsal two-cortices technique results in only the dorsomedial cortex being compressed, and the osteotomy is unable to resist axial loads adequately.<sup>4</sup> Providing increased stability, a wire passing four cortices as a vertical loop perpendicular to the plane of the osteotomy is recommended.<sup>3</sup> A horizontal loop can also be used but this requires a greater amount of soft tissue dissection.<sup>3</sup> In both techniques, the surgeon must rely on an intact lateral cortical hinge for added stability. Although some interfragmentary compression is acquired, this method does not result in rigid internal fixation and therefore caution should be taken with weight bearing. Fixation of a metatarsal osteotomy with cerclage is also possible but is not currently considered the ideal choice by most surgeons. Nevertheless, it may prove to be a useful technique to have in one's arsenal if the primary form of fixation has failed and a bail out option is necessary (**Fig. 1**).

### *Transfixation with Kirshner Wires*

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The main benefits to using Kirshner wires (also known as K-wires) are their ease of use and low level of cost. Although they do afford some stability across an osteotomy or fusion site, they do not provide the advantage of interfragmentary compression. K-wires allow for adequate resistance to motion perpendicular to the wire. However, when the movement is parallel to the wire, they offer little use.<sup>5</sup> Rigidity can be significantly increased by placing two K-wires at 90° to one another.<sup>2</sup> Wires can be found with both smooth and threaded tips, with the threaded version providing slightly more stability. Aside from lack of rigid compression, another disadvantage of K-wire fixation is the heat generated with insertion. Some argue that this may lead to bone necrosis and is caused by the absence of real cutting facets and flutes.<sup>2</sup> Studies have shown that thinner wires (<1.1 mm) generate less heat than thicker ones, and that diamond-tip wires generate less heat than smooth or trocar-tip wires.<sup>2</sup> Regardless of these issues, K-wires have continued to be a tried and true method of fixation for many applications in hallux valgus surgery. One other option available if wire fixation is desired is absorbable pins. These can be used in the same fashion as an ordinary K-wire, but negate the need for possible removal in the future.

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